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Prospecting for spiral structure in the flocculent outer Milky Way Disk with color magnitude star counts from the 2 Micron All Sky Survey

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abstract Using star counts in both color and magnitude from the Two Micron All Sky Survey (2MASS) Second Incremental Release Point Source Catalog we search for evidence of non-uniform extinction and stellar population density changes in the Galactic Plane. Extinction causes the entire main sequence to shift toward redder colors on a color magnitude diagram. A local increase in the stellar density causes an increase in the star counts along a line parallel to the main sequence. We find streaks in star count color magnitude contour plots along the angle of the main sequence which are likely to be caused by distant gas clouds and stellar density variations. The distance of a gas cloud or stellar density change can be estimated from the location of the shift in the star count contours. We identify features in these diagrams which are coherent across at least 10 degrees in Galactic longitude. A series of features is seen at the plausible distance of the expected Perseus spiral arm at a distance of 2 to 4 kpc from the sun. However other features as prominent are found at both at larger and smaller distances. These structures are over 300 pc in size and so likely to be associated with large scale coherent structures in the gas distribution such as weak spiral arms. The presence of multiple and weak spiral arms, and lack of strong ones suggests that the outer Milky Way is flocculent in its morphology.